Sample Size Calculator

Please Note:

- This calculator should be used for simple random samples only.
- The calculator determines sample sizes for estimates of proportions. In this case Standard Errors are the most appropriate measure of sampling error. Relative Standard Errors are not recommended and can be misleading.
- We no longer actively support this calculator. Any samples sizes generated are used at your own risk.

Determine Sample Size

Confidence Level:

Population Size:

Proportion:

● Confidence Interval:

Upper

Lower

○ Standard Error

○ Relative Standard Error

○ Sample Size:

How do I use it?

1. Select the Confidence Level you want to work at.
2. If you are sampling from a finite population (one that isn't very large), enter the Population Size.
3. If you already know the estimate Proportion, or want to check the Relative Standard Error of an existing estimate, fill in the Proportion. If left blank it will be assumed to be 0.5.
4. You must fill in one of the Confidence Interval, Standard Error, Relative Standard Error or Sample Size. Make sure the bullet point corresponding to the one you wish to specify is selected.
5. Press **Calculate** to perform the calculation, or **Clear** to start again.

Sample Size Calculator Help

Sample Size Calculator Definitions

Sample Size Calculator Examples

Sample Size Calculator Stratification Examples

This page last updated 21 May 2024

Sample Size Calculator Help

What does it do?

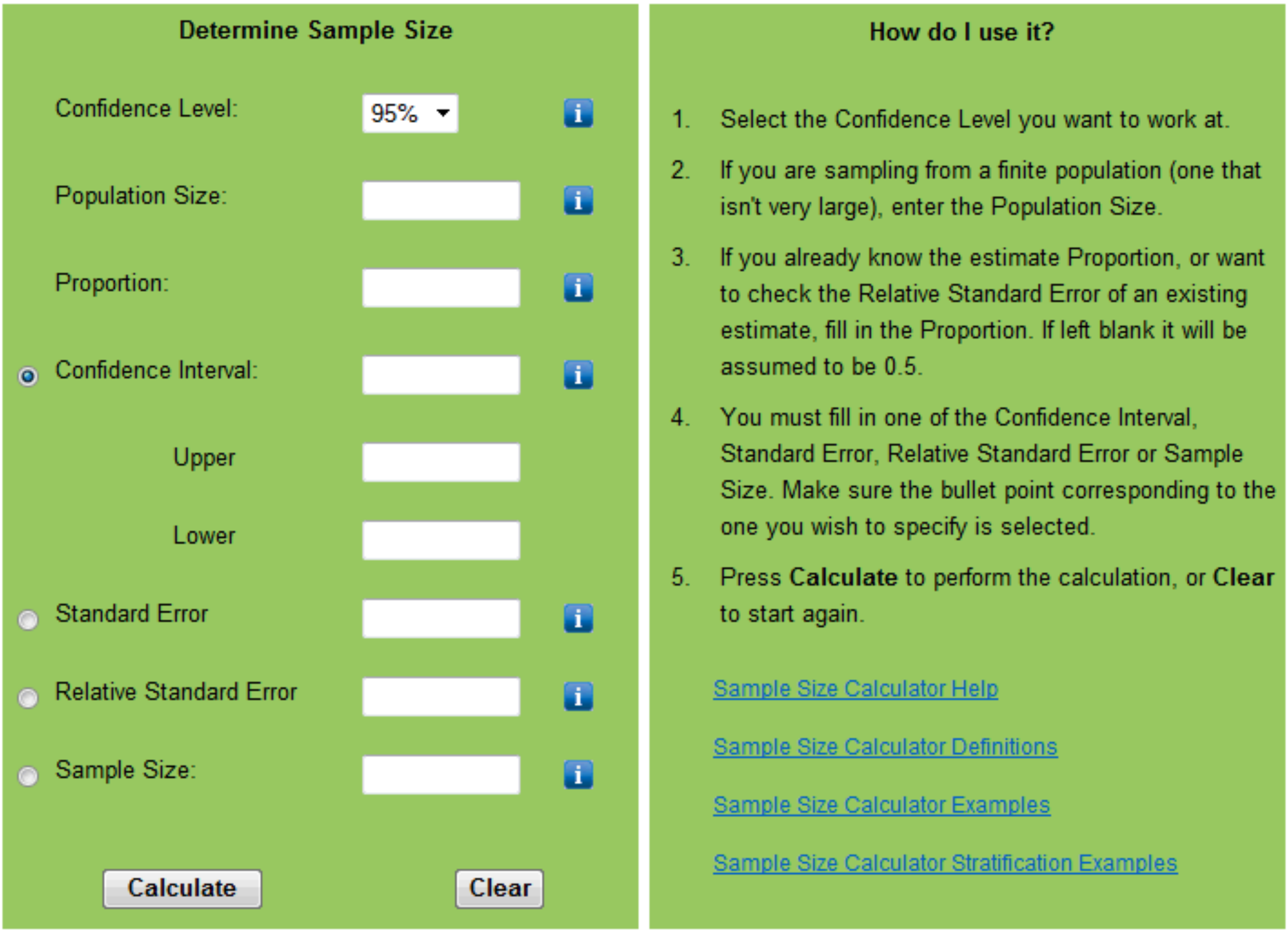
The sample size calculator allows you to calculate the required responding sample size, standard error, RSE, and a confidence interval (95% or 99%) for a proportion estimate, using just one of these criteria as an input. For example, if you know the standard error you need to meet precision requirements of your estimate, you can find out the responding sample size required to achieve that; if you know the likely size of the responding sample you can estimate the standard error of your estimate, and a confidence interval for it.

It is recommended that the level of precision be set to allow the survey to achieve the desired outputs. The level of precision should be set in conjunction with the users of the data. You should not set the accuracy levels too high, as you will incur higher costs (due to a larger sample size) and place additional burden on the community. You should also not set the accuracy levels too low, as your data may not be appropriate for your users.

The sample size calculator assumes simple random sampling. The results generated here are intended only as a guide and should only be used as such. They are by no means the definitive "rule" about the size of a sample.

How do I use it?

Simply follow the steps outlined below.



Determine Sample Size

Confidence Level: 95%

Population Size:

Proportion:

● Confidence Interval:

Upper

Lower

○ Standard Error

○ Relative Standard Error

○ Sample Size:

How do I use it?

1. Select the Confidence Level you want to work at.
2. If you are sampling from a finite population (one that isn't very large), enter the Population Size.
3. If you already know the estimate Proportion, or want to check the Relative Standard Error of an existing estimate, fill in the Proportion. If left blank it will be assumed to be 0.5.
4. You must fill in one of the Confidence Interval, Standard Error, Relative Standard Error or Sample Size. Make sure the bullet point corresponding to the one you wish to specify is selected.
5. Press **Calculate** to perform the calculation, or **Clear** to start again.

Sample Size Calculator Help

Sample Size Calculator Definitions

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Sample Size Calculator Stratification Examples

What do the categories mean?

Confidence Level
This is the level of certainty with which you will estimate the true population value. You can select either 95% or 99%, meaning that there are 95 (or 99) chances out of 100 that the true value of the estimate is within the confidence interval.

Population Size
This is the total number of individuals or groups about which information is required. This option can be left blank, in which case the population size is assumed to be very large.

The target population is the population about which information is to be sought. The target population is also known as the scope of the survey i.e. the population that the survey is aimed at. For a sample survey, a sample is taken from the population.

Proportion
This specifies the expected proportion of the population to have the attribute that you are estimating from your survey. This assists in calculating the estimated standard errors that are appropriate for your situation. You can get the proportion from previous cycles of the survey or by an educated guess. If this proportion is unknown, it should be set to 0.5 (i.e. 50%), as this produces a conservative estimate of variance.

For example, if you want to estimate how many customers were satisfied with your service, and you have data from last year saying that 50% of customers were satisfied, then you would enter 0.5.

Confidence Interval
The confidence interval allows you to specify the desired level of accuracy of the estimate. The confidence interval value is expressed as a proportion, meaning that if you want the result to be accurate within 5 percentage points, then you should enter 0.05. You can specify an interval from 0 to 0.5. The narrower the interval the more precise the estimate.

Confidence Interval: Upper and Lower
These are the upper and lower bounds of the confidence interval, as determined by the specified interval. For example, if the is proportion os 0.5 and the specified confidence Interval is 0.05, then the upper and lower bounds will be 0.5 +/- 0.05, which gives you a confidence interval from 0.45 to 0.55.

Standard Error
This is a measure of sampling error that indicates the degree to which an estimate may vary from the true value. The standard error is expressed in the same units as the estimate (in the case of this calculator it is a proportion). Higher standard errors indicate more variation in the estimate.

Relative Standard Error (RSE)
This is the standard error expressed as a percentage of the estimate. The RSE is a useful measure of accuracy, as it gives an indication of the percentage errors likely to have occurred due to sampling. For example, if the proportion is 0.5 and the standard error is 0.05 then the RSE will be 10%.

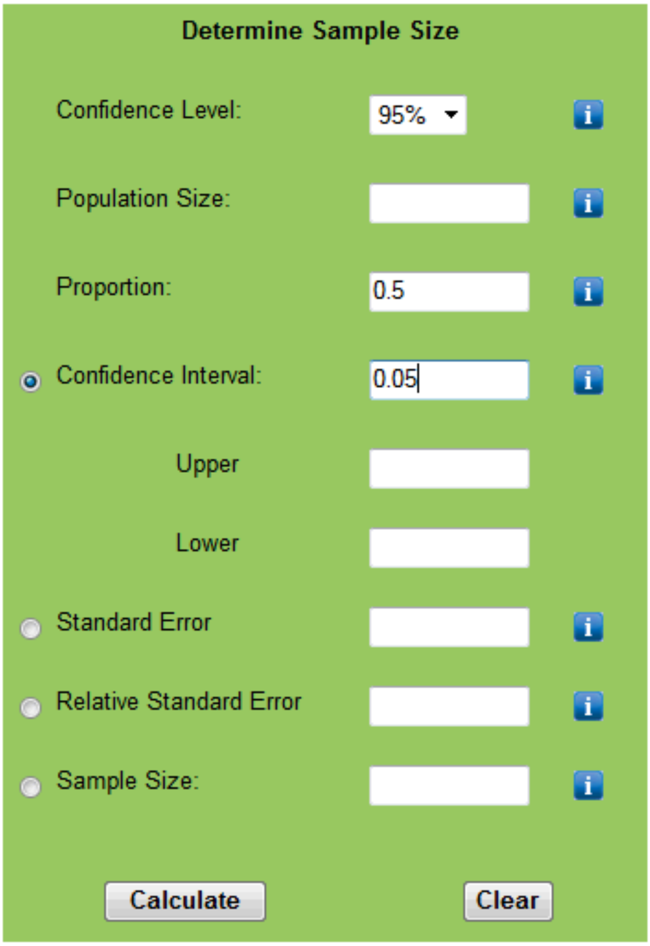
Sample Size
The sample size refers to the number of individuals or groups required to respond (not just the number approached) to achieve the required level of accuracy (specified by entering either the confidence or error required). For example, if your required sample size from the calculator is 100 and you expect only 10% of your sample to respond, then you will need to approach 1000 units in order to achieve the sample size of 100.

What do the Results mean?

Entering the Confidence Level, Proportion, and Confidence Interval into the Calculator to determine the required sample size:

To be 95% confident that the true value of the estimate will be within 5 percentage points of 0.5, (that is, between the values of 0.45 and 0.55), the required sample size is 385. This is the number of actual responses needed to achieve the stated level of accuracy. You need to take into account any expected non-response when calculating the number of individuals or groups that you will approach for the survey. The standard error of 0.026 on the estimate of 0.5 produces an RSE of 5.1%.

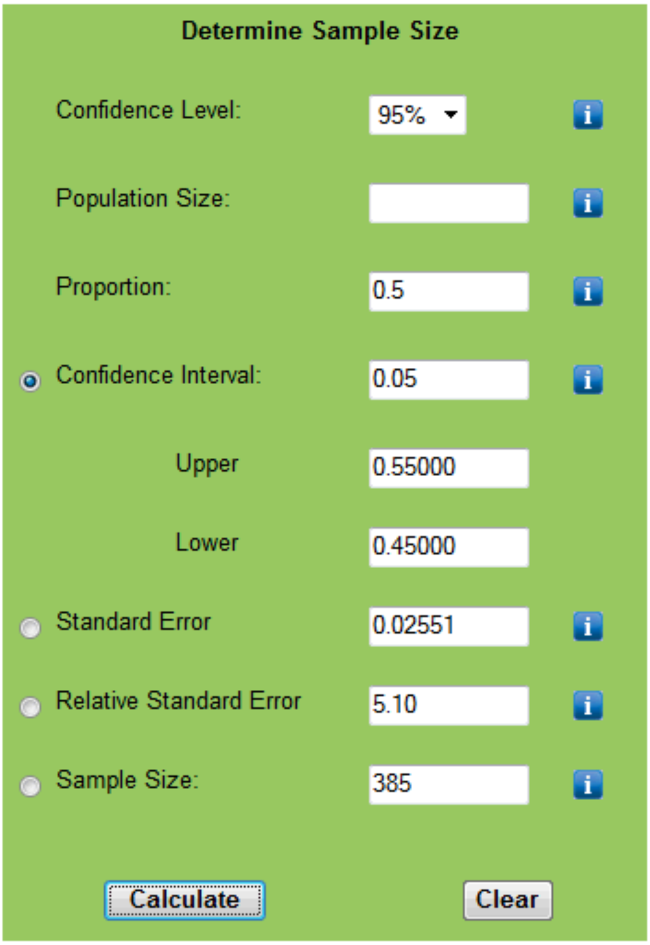
Before Calculate



Determine Sample Size

Confidence Level: 95%
Population Size:
Proportion: 0.5
● Confidence Interval: 0.05
Upper
Lower
○ Standard Error
○ Relative Standard Error
○ Sample Size:

After Calculate



Determine Sample Size

Confidence Level: 95%
Population Size:
Proportion: 0.5
● Confidence Interval: 0.05
Upper 0.55000
Lower 0.45000
○ Standard Error 0.02551
○ Relative Standard Error 5.10
○ Sample Size: 385

For more examples of how to use the Sample Size Calculator, see [Sample Size Calculator Examples](#).

Click here to begin using the [Sample Size Calculator...](#)

This page last updated 4 April 2023

Sample Size Calculator - Hover Over Definitions

Confidence Level
This is the level of certainty with which you will estimate the true population value. You can select either 95% or 99%.

Population Size
This is the total number of individuals or groups about which information is required.

Proportion
This specifies the expected proportion of the population to have the attribute that you are estimating from your survey. You can get the proportion from previous cycles of the survey or by an educated guess. If this proportion is unknown, it should be set to 0.5 (i.e. 50%), as this produces a conservative estimate of variance.

Confidence Interval
This allows you to specify the desired level of accuracy of the estimate. The confidence interval value is expressed as a proportion, meaning that if you want the result to be accurate within 5 percentage points, then you should enter 0.05.

Confidence Interval: Upper and Lower
These are the upper and lower bounds of the confidence interval, as determined by the specified interval. For example, if the proportion os 0.5 and the specified confidence Interval is 0.05, then the upper and lower bounds will be 0.5 +/- 0.05, which gives you a confidence interval from 0.45 to 0.55.

Standard Error
This is a measure of sampling error that indicates the degree to which an estimate may vary from the true value.

Relative Standard Error
This is the standard error expressed as a percentage of the estimate.

Sample Size
This refers to the number of individuals or groups required to respond (not just the number approached) to achieve the required level of accuracy.

For a more detailed explanation of what each of these categories mean see Sample Size Calculator Help

Click here to begin using the Sample Size Calculator...

This page last updated 4 April 2023

Sample Size Calculator Examples

Example 1

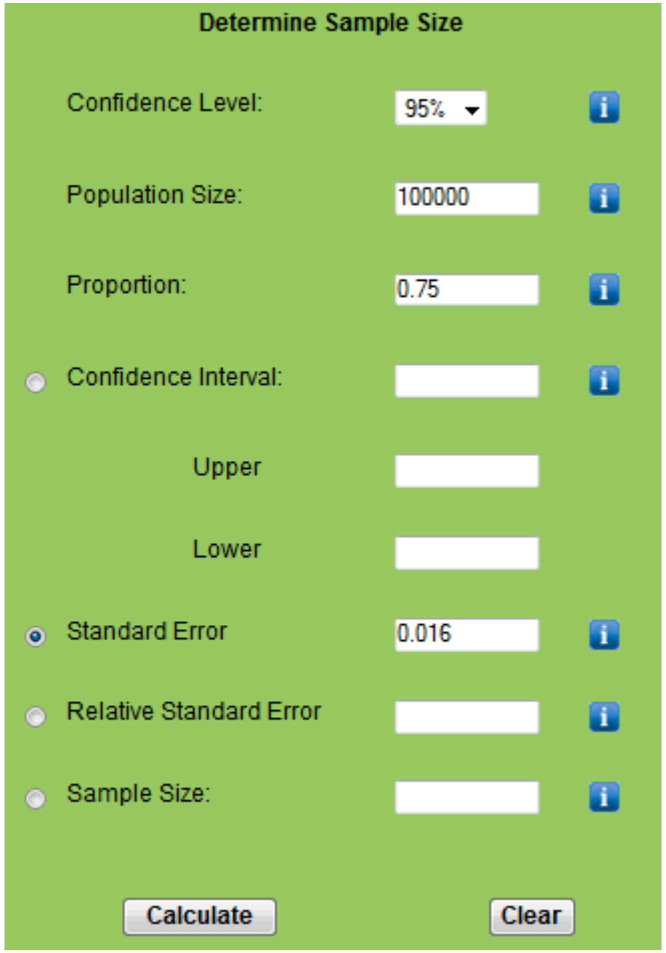
You are about to do the fourth cycle of an audit for compliance to a particular program.
From the previous three cycles, compliance rates have been around 75%, with the desired standard error around 1.6.
There are 100,000 businesses on the frame.

What sample size should you use?

Use...
Confidence Level = 95%
Population = 100,000
Proportion = 0.75
Standard Error = 0.016

Then press **calculate**

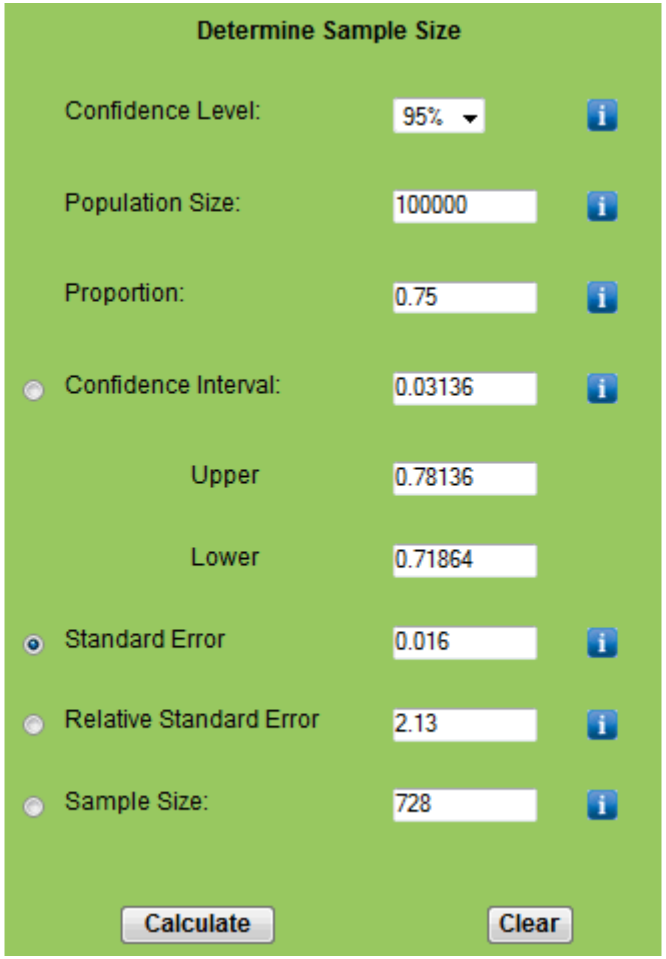
Before Calculate



Determine Sample Size

Confidence Level: 95%
Population Size: 100000
Proportion: 0.75
○ Confidence Interval:
Upper
Lower
● Standard Error 0.016
○ Relative Standard Error
○ Sample Size:

After Calculation



Determine Sample Size

Confidence Level: 95%
Population Size: 100000
Proportion: 0.75
○ Confidence Interval: 0.03136
Upper 0.78136
Lower 0.71864
● Standard Error 0.016
○ Relative Standard Error 2.13
○ Sample Size: 728

Example 2A

You have an allocated budget of $10,000 to determine how satisfied your customers are. You have decided to run a survey. Your database shows that you have 38,000 customers. Last year's survey determined 40% of clients were satisfied.

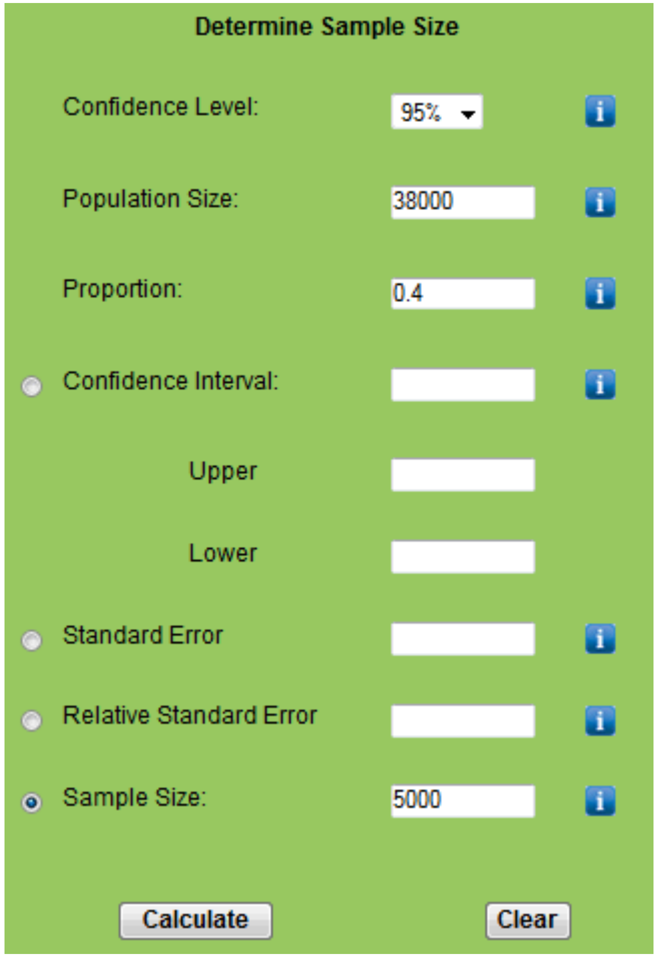
From your budget you have determined that 5,000 businesses can be approached. Is this too many?

Use...
Confidence Level = 95%
Population = 38,000
Proportion - Let's say 40% again
Sample Size = 5,000

Then press **calculate**

The estimated **Standard Error**, in this example is more accurate than it needs to be and therefore we can decrease the sample size with limited impact on the overall accuracy.
In **example 2B** below, we reduce the sample size to 500.

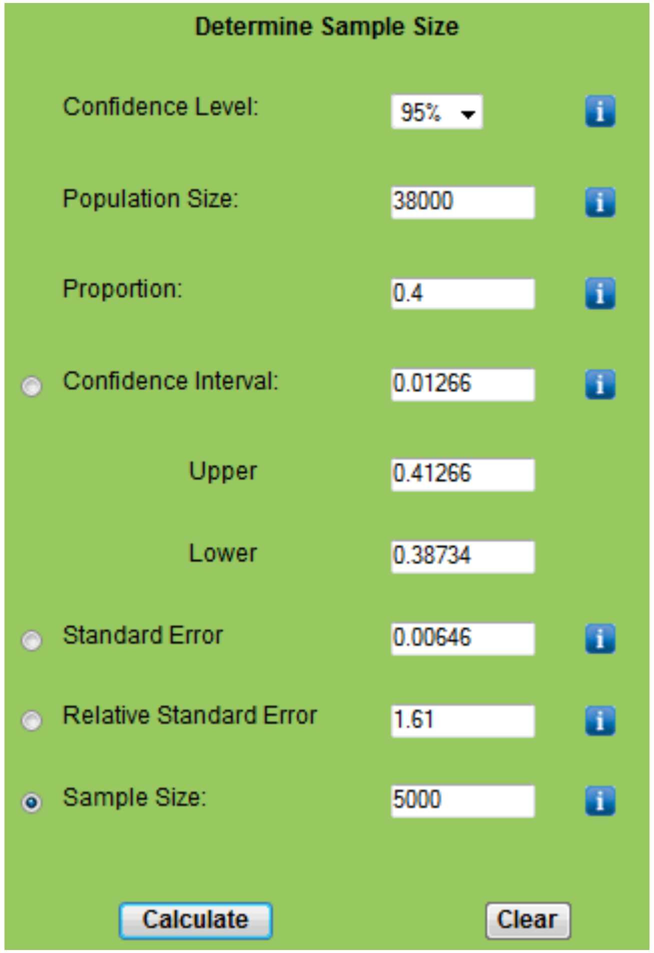
Before Calculate



Determine Sample Size

Confidence Level: 95%
Population Size: 38000
Proportion: 0.4
○ Confidence Interval:
Upper
Lower
○ Standard Error
○ Relative Standard Error
● Sample Size: 5000

After Calculation



Determine Sample Size

Confidence Level: 95%
Population Size: 38000
Proportion: 0.4
○ Confidence Interval: 0.01266
Upper 0.41266
Lower 0.38734
○ Standard Error 0.00646
○ Relative Standard Error 1.61
● Sample Size: 5000

Example 2B

Using the same scenario, as in example 2A, but using a sample size of 500.

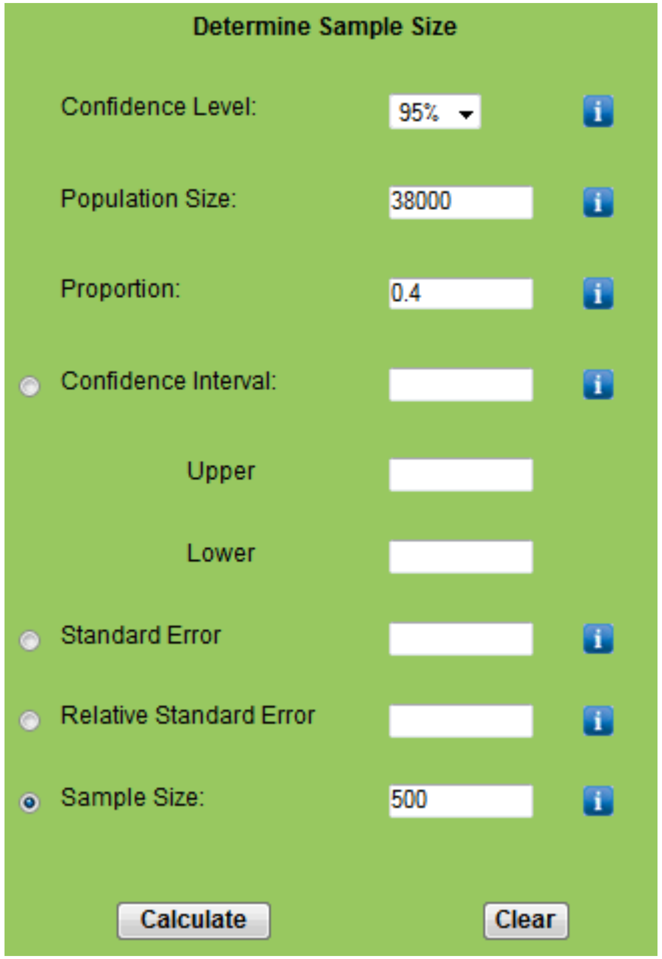
Use...
Confidence Level = 95%
Population = 38,000
Proportion - Let's say 40% again
Sample Size = 500

Then press **calculate**

Although the estimated standard error has increased it is sufficient for our survey objectives.

It is important to ensure the sample size is the minimum size that will achieve the desired accuracy.
The decreased sample size will reduce provider burden and survey costs.

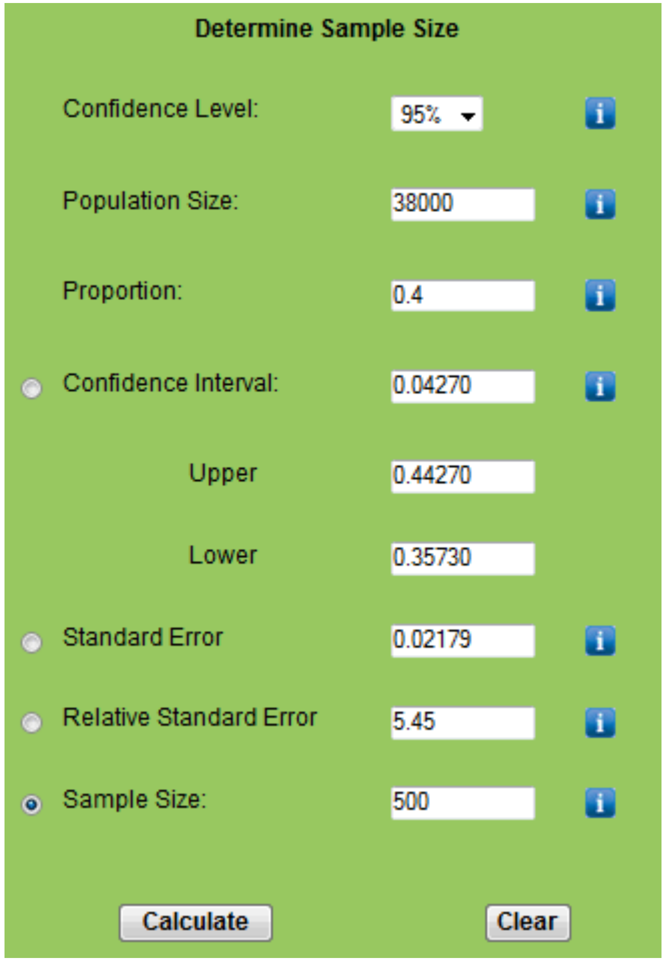
Before Calculation



Determine Sample Size

Confidence Level: 95%
Population Size: 38000
Proportion: 0.4
○ Confidence Interval:
Upper
Lower
○ Standard Error
○ Relative Standard Error
● Sample Size: 500

After Calculation



Determine Sample Size

Confidence Level: 95%
Population Size: 38000
Proportion: 0.4
○ Confidence Interval: 0.04270
Upper 0.44270
Lower 0.35730
○ Standard Error 0.02179
○ Relative Standard Error 5.45
● Sample Size: 500

Sample Size Calculator example using stratified random sampling

What is stratified random sampling?

Stratified random sampling is the technique of breaking the population of interest into groups (called strata) and selecting a random sample from within each of these groups. Breaking the population up into strata helps ensure a representative mix of units is selected from the population and enough sample is allocated to groups you wish to form estimates about. For instance, you may wish to stratify by Geography (eg: state) to ensure a good mix of geographical areas are selected, or to help produce estimates for different geographical areas. For more information on stratification, refer to the Basic Survey Design manual on the ABS website by clicking here.

Example

You have an allocated budget of $10,000 to determine how satisfied your customers are. You have decided to run a survey and you want to produce estimates for large, medium and small size business customers. Your database shows that you have 10,000 large business customers, 20,000 medium business customers, and 8,000 small business customers. Last year's survey determined:
- 40% of large size businesses were satisfied
- 50% of medium size businesses were satisfied
- 60% of small size businesses were satisfied
- 49% satisfaction across all businesses

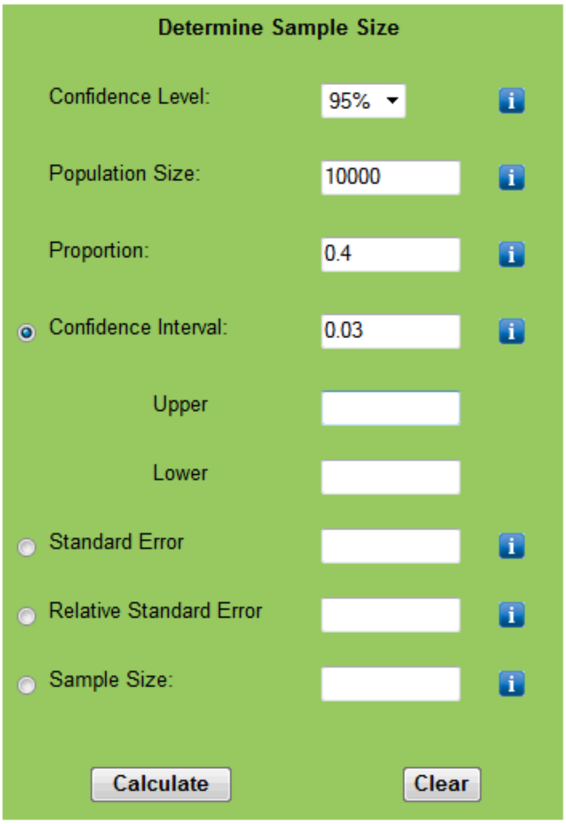
You also decide you want your margin of error for each group to be plus/minus 3 percentage points, with 95% confidence. This means you can be confident that in 95% of samples, the confidence interval will cover the true value of customer satisfaction.

To determine the total sample size required, you need to enter details into the sample size calculator for each stratum one at a time.

Large business stratum calculation

Sample required for this stratum is 930.

Before Calculate	After Calculate



Determine Sample Size

Confidence Level: 95%

Population Size: 10000

Proportion: 0.4

● Confidence Interval: 0.03

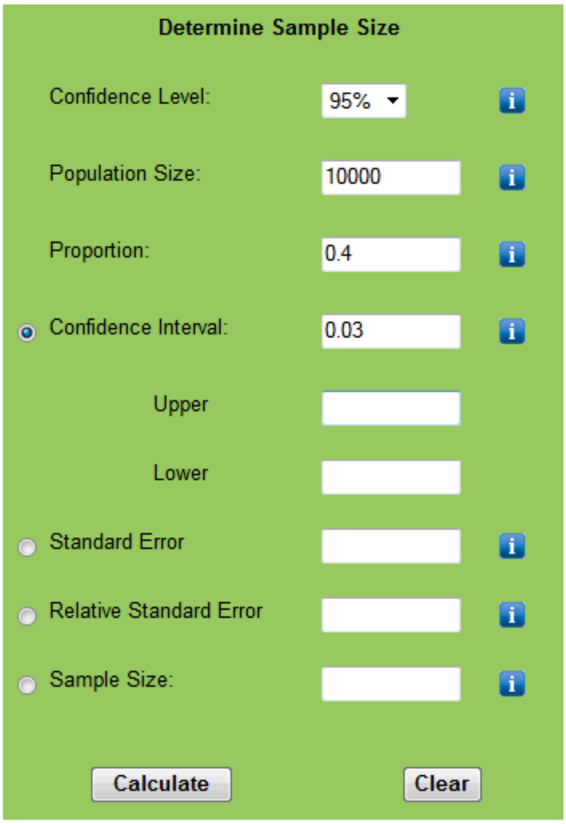
Upper

Lower

○ Standard Error

○ Relative Standard Error

○ Sample Size:



Determine Sample Size

Confidence Level: 95%

Population Size: 10000

Proportion: 0.4

● Confidence Interval: 0.03

Upper

Lower

○ Standard Error

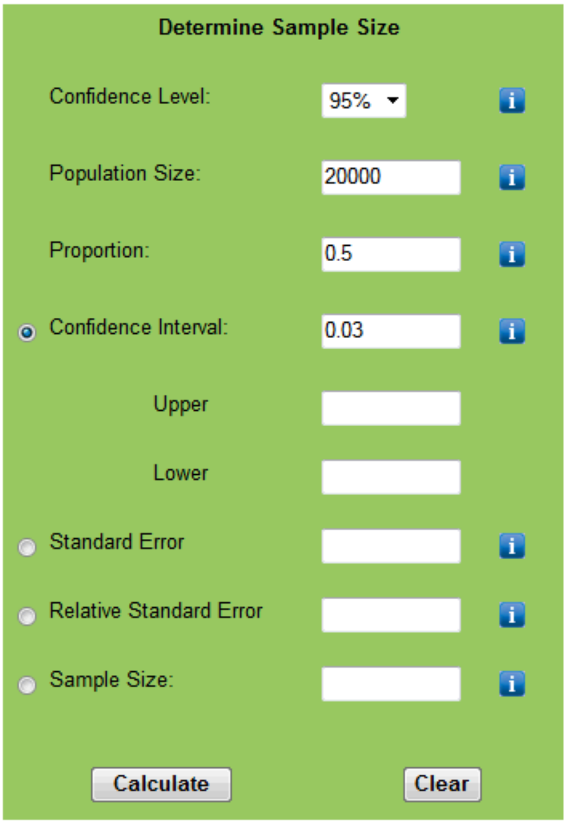
○ Relative Standard Error

○ Sample Size:

Medium business stratum calculation

Sample required for this stratum is 1,014.

Before Calculate



Determine Sample Size

Confidence Level: 95%

Population Size: 20000

Proportion: 0.5

● Confidence Interval: 0.03

Upper

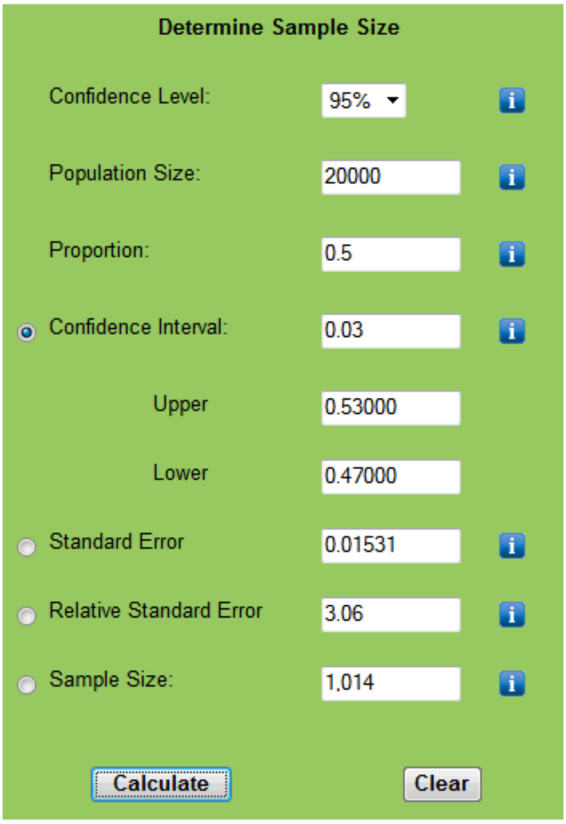
Lower

○ Standard Error

○ Relative Standard Error

○ Sample Size:

After Calculate



Determine Sample Size

Confidence Level: 95%

Population Size: 20000

Proportion: 0.5

● Confidence Interval: 0.03

Upper 0.53000

Lower 0.47000

○ Standard Error 0.01531

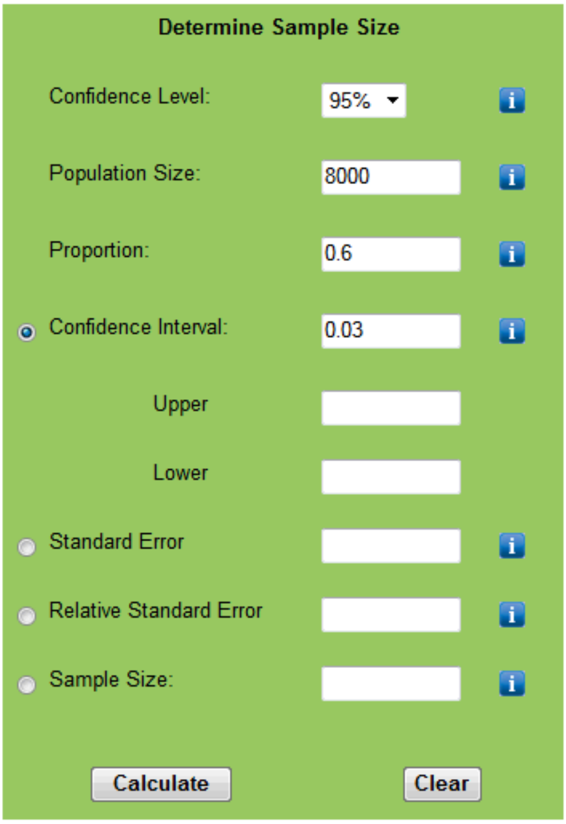
○ Relative Standard Error 3.06

○ Sample Size: 1,014

Small business stratum calculation

Sample required for this stratum is 909.

Before Calculate



Determine Sample Size

Confidence Level: 95%

Population Size: 8000

Proportion: 0.6

● Confidence Interval: 0.03

Upper

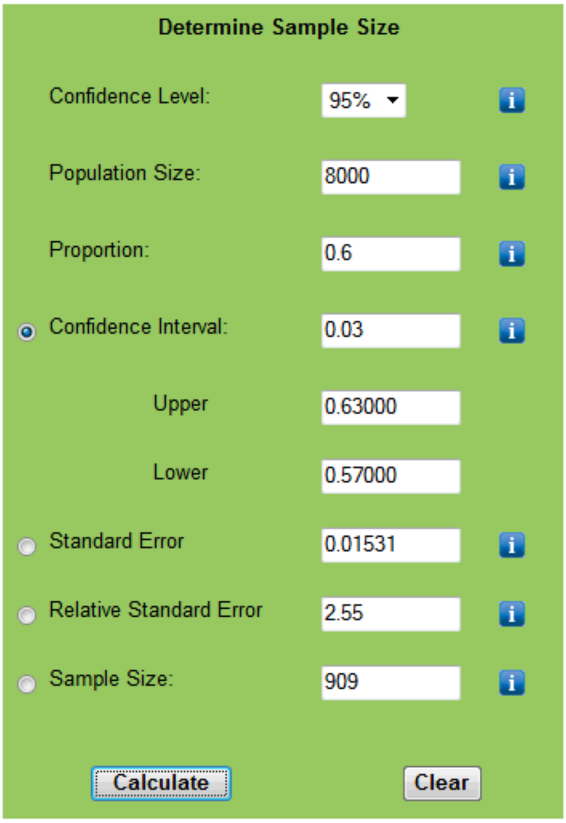
Lower

○ Standard Error

○ Relative Standard Error

○ Sample Size:

After Calculate



Determine Sample Size

Confidence Level: 95%

Population Size: 8000

Proportion: 0.6

● Confidence Interval: 0.03

Upper 0.63000

Lower 0.57000

○ Standard Error 0.01531

○ Relative Standard Error 2.55

○ Sample Size: 909

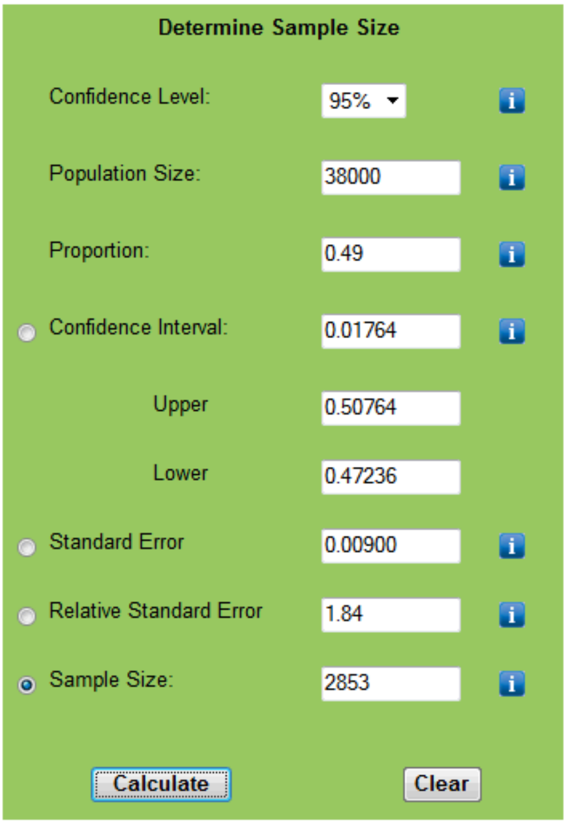
Total sample size required

The total sample size required to meet the three accuracy constraints is 930 + 1014 + 909 = 2,853
If this sample size is too large for the survey budget, quality constraints could be reduced on lower priority strata.

What is the quality of the population estimate?

The calculator displays the standard error and relative standard error (RSE) for each stratum. But what about the quality of the estimate for the whole population (ie small, medium, and large businesses combined)?

One way to calculate the RSE for the population estimate is to enter the total population size (38,000), the total sample size (2,853), and the proportion of satisfied businesses in the whole population (0.49) into the sample size calculator. This results in an RSE of 1.84%. Note that this RSE is only an estimate, as it does not take into account the impact of stratification.


Determine Sample Size

Confidence Level: 95%

Population Size: 38000

Proportion: 0.49

○ Confidence Interval: 0.01764

Upper 0.50764

Lower 0.47236

○ Standard Error 0.00900

○ Relative Standard Error 1.84

● Sample Size: 2853

If required, a more accurate population RSE can be calculated using the formula below. This first formula uses the following items to first calculate the standard error (SE) for the population estimate:

- The standard error of each stratum (SE_1, SE_2, SE_3)
- The size of the population for each stratum (N_1, N_2, N_3)
- The total population size (N)

$$SE = \frac{\sqrt{SE_1^2 N_1^2 + SE_2^2 N_2^2 + SE_3^2 N_3^2}}{N}$$

$$= \frac{\sqrt{0.01531^2 \times 10000^2 + 0.01531^2 \times 20000^2 + 0.01531^2 \times 8000^2}}{38000}$$

$$= 0.0096$$

To determine the RSE for the population estimate, we now need to divide the standard error by the population estimate (49%). In this example, the calculation would look like:

$$RSE = \frac{SE}{estimate}$$

$$= \frac{0.0096}{0.49}$$

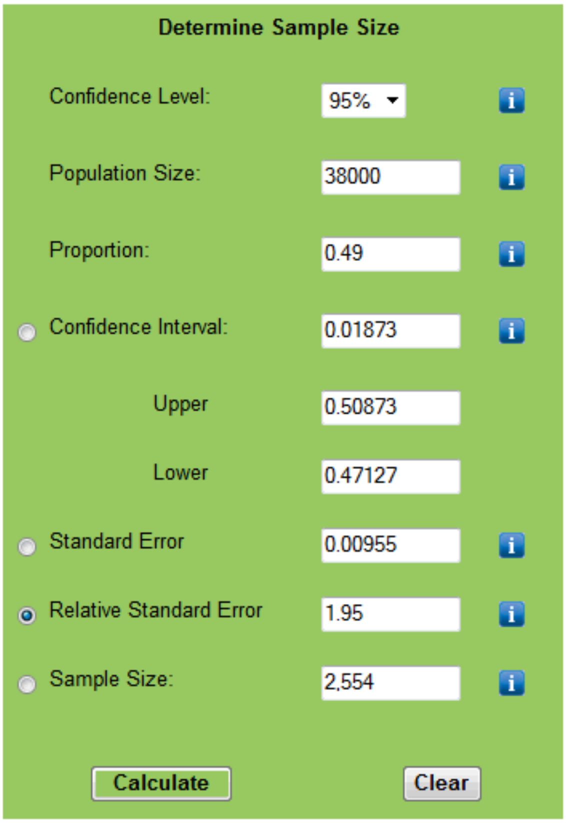
$$= 0.0195$$

This means that this design would result in a population estimate with an RSE of 1.95%.

Why are the RSEs different?

You can see from the above example that the RSE of 1.95% derived using the formula is slightly larger than the RSE of 1.84% that is obtained in the sample size calculator. This is because the formula takes into account the stratification.

To show this in a different way, lets examine the case where we don't use stratification, but want the same RSE constraint of 1.95% for the total population estimate. In this case, the sample size calculator shows that to achieve an RSE of 1.95%, a sample size of only 2,554 businesses is required. This is 299 businesses less than the sample size required when stratification is used. This demonstrates that although using stratification in the design achieved equal quality for each of the business groups, the population RSE is slightly higher than in the non-stratification design. Putting it another way, if you didn't use stratification in this design, you could have achieved the same overall RSE of 1.95% for the total population estimate but sample 299 fewer businesses. This means the cost of the survey would be reduced, but you would have no control over the RSEs you achieved for each of the business groups you are interested in.



Confidence Level: 95%

Population Size: 38000

Proportion: 0.49

○ Confidence Interval: 0.01873

Upper 0.50873

Lower 0.47127

○ Standard Error 0.00955

● Relative Standard Error 1.95

○ Sample Size: 2,554

Survey managers can read more about stratification and sample allocation on the NSS website, including methods of allocating sample to strata to suit various output requirements, by [clicking here].

Click here to begin using the [Sample Size Calculator...]

This page last updated 4 April 2023